Type 1232-P2 PREAMPLIFIER

SPECIFICATIONS

Input Impedance: Greater than 100 MΩ in parallel with 70 pF.

Output Impedance: 10 kΩ.

Approximate Voltage Gain: 0.7

Noise Referred to Input: When the Preamplifier is connected to a Type 1232-A Tuned Amplifier and Null Detector whose FILTER FREQUENCY is set to 100 Hz, the equivalent noise generators at the input are:

Open-circuit noise --- 0.1 pA

Short-circuit noise --- 0.3 μV.

Optimum Source Impedance: 3 MΩ.

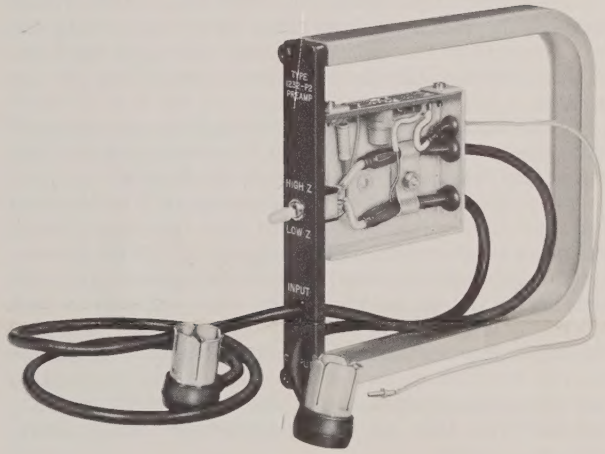


Figure 1. The Type 1232-P2 Preamplifier.

The Type 1232-P2 Preamplifier (Figures 1 and 9) is an accessory for the Type 1232 Tuned Amplifier and Null Detector. It consists of a low-noise field-effect transistor connected as a source follower. A front-panel switch on the preamplifier allows it to be bypassed (LOW Z position). The preamplifier is designed to improve the signal-to-noise ratio and consequently the effective sensitivity of the Type 1232 when the latter is used to make measurements with bridges whose output impedance exceed 100 kΩ. For such measurements the preamplifier front-panel switch should be set to HIGH Z. When low impedances are being measured, the direct Type 1232 input provides better sensitivity, hence the preamplifier switch should be set to LOW Z in such such cases.

Use of the Type 1232-P2 will be advantageous with the Type 1615 Capacitance Bridge when the bridge is operating in its lowest "C" and "D" ranges (and only when used in these ranges). The most common application of the Type 1232-P2 will be measurement of small capacitances or of small dissipation factors on the Type 1615 at frequencies below 1 kHz.

Figure 2 is a comparison of typical relative noise levels versus input source impedance for the Type 1232 alone and for the combination of the Type 1232 and the preamplifier. As this graph shows, use of the Type 1232-P2 is definitely advantageous when the output impedance of the signal source is greater than 200 kΩ. The direct Type 1232 input provides a better signal-to-noise ratio for input impedances of less than 50 kΩ.

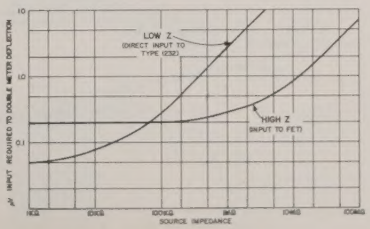


Figure 2. Relative noise level vs input source impedance of a typical Type 1232-AP with the FILTER FREQUENCY set to 100 Hz.

ASSEMBLY OF THE TYPE 1240-AP

Dimensions of the Type 1240-AP Bridge Oscillator-Detector are shown in Figure 3. Table 1 lists the hardware included with the Type 1240-AP.

TABLE 1

Quantity	*Item*	*Part Number*
8	Bracket	0480-8070
1	Plate, White Plastic	1232-7300
2	Screw, 10-32, 5/8-in	7080-2000
4	Screw, 10-32, 1/2-in	7098-0161
4	Washer, Split	5810-3300
4	Nut, 10-32	8040-2400
2	Rack Adaptor Plate	0480-8829
4	Screw, Panel, with Cup Washers	7270-6210

Bench Model

a. Turn the Type 1232 and the Type 1311 upside down so that their rubber feet are upward.

b. Remove and retain the two left-hand front-panel screws from the Type 1232, the two right-hand front-panel screws from the Type 1311, and all the front-panel screws from the Type 1232-P2. The washers between the end frames and panels may be discarded.

c. Remove and retain the U-shaped end frame from the Type 1232-P2. Remove the side panel from the end frame. This panel may be discarded.

d. Place two brass brackets (B) in the spaces between the end frame and panel of the Type 1232 and two brackets in the corresponding spaces on the Type 1311. Replace the front-panel screws, but do not tighten.

d. Remove the rubber foot and associated screw from the left rear of the Type 1232 and the rubber foot and screw from the right rear of the Type 1311.

f. Thread the two 5/8-in screws (C) included in the Type 1240-AP hardware set into the long side of the white plastic plate (E in Figure 4). With the two instruments side by side, insert the screws into the end frames and thread the rubber feet removed in step e onto the screws (C).

g. Remove the cover from the Type 1232: loosen the two knurled screws at the rear of the instrument and slide the cover back and off. Swing the Type 1232 and the Type 1311 as far apart as the white plastic plate will allow.

h. Slide the Type 1232-P2 halfway into the space between the other two instruments and thread the white B+ lead from the Type 1232-P2 through the hole (E) in the lower back corner of the Type 1232. Plug the wire into the red jack inside the Type 1232 (see Figure 7 of the Type 1232 instruction manual). Replace the cover on the Type 1232.

NOTE

If there is no red B+ jack in your Type 1232, solder a short length of wire to the junction of R101, R102, and C102 on the preamplifier etched board inside the Type 1232 (see Figures 9 and 11 of the Type 1232 instruction manual), and connect it to the Type 1232-P2 B+ lead.

i. Slide the Type 1232-P2 farther into the space between the Type 1232 and the Type 1311, and at the same time swing the latter instruments together so

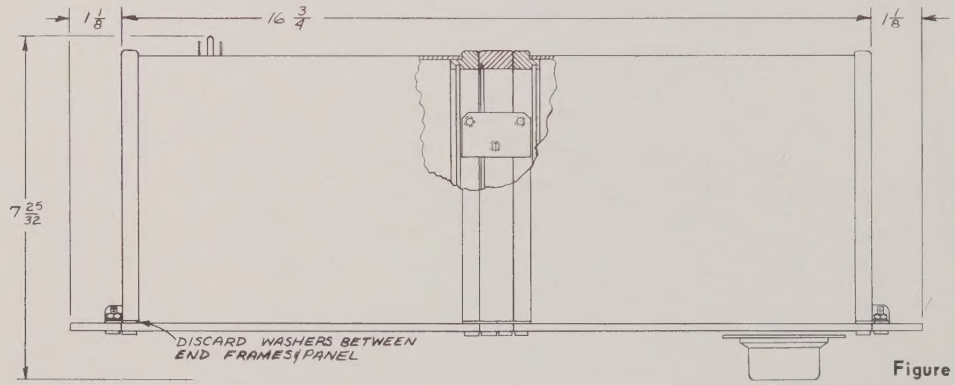
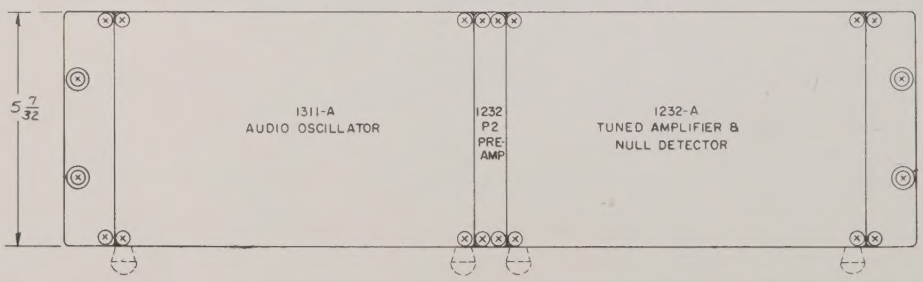


Figure 3. Dimensions of the Type 1240-AP.



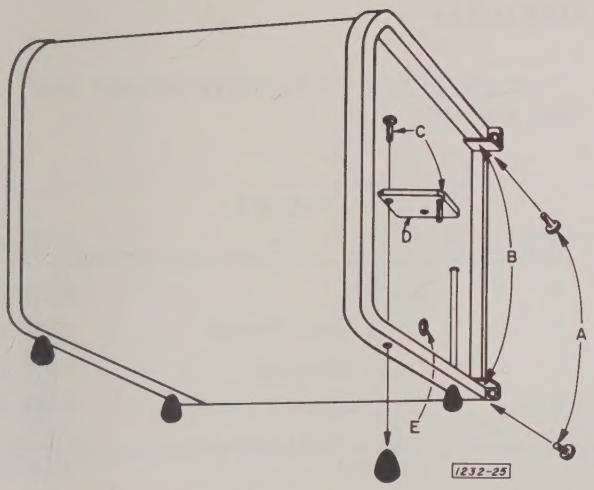


Figure 4. Assembly of the Type 1240-AP.

that the brackets inserted in step b line up with the holes in the front panel of the Type 1232-P2.

j. Slide the Type 1232-P2 end frame (removed in step c) back on its instrument and secure it and the brackets on the Type 1311 and Type 1232 to the Type 1232-P2 with the four front-panel screws removed in step b. The hole in this end frame should be underneath when the assembly is placed right-side up on its rubber feet.

k. Insert a 10-32, 1/2-in screw through the hole in the preamplifier frame and thread it into the white plastic plate.

i. Plug the OUTPUT connector of the Type 1232-P2 into the INPUT jack of the Type 1232.

Rack Model

a. Turn the Type 1232 and the Type 1311 upside down so that their rubber feet are upward.

b. Remove all the rubber feet and associated screws from the Type 1232 and from the Type 1311. Remove the rods which form the extendible legs on the Type 1232, being careful not to lose the small brass rods and the springs, which should be left inside the end frames (in case bench mounting should be desired again). Retain three of the 10-32, 1/2-in screws.

c. Remove and retain the two left-hand front-panel screws from the Type 1311, and all the front panel screws from the Type 1232-P2. The washers between the end frames and panels may be discarded.

d. Remove and retain the U-shaped end frame from the Type 1232-P2. Remove the side panel from the end frame. This panel may be discarded.

e. From the outside, insert one of the 10-32, 1/2-in screws retained in step b through the hole in the bottom of the end frame of the Type 1232-P2 and thread it into the center hole in the white plastic plate. The other two holes in the plate should lie towards the rear of the instrument.

f. Remove the cover from the Type 1232: loosen the two knurled screws at the rear of the instrument and slide the cover back and off.

g. Thread the white B+ lead from the Type 1232-P2 through the hole (E) in the lower back corner of the Type 1232. Plug the wire into the red jack inside the Type 1232 (see Figure 7 of the Type 1232 instruction manual). Replace the cover on the Type 1232.

NOTE

If there is no red B+ jack in your Type 1232, solder a short length of wire to the junction of R101, R102, and C102 on the preamplifier etched board inside the Type 1232 (see Figures 9 and 11 of the Type 1232 instruction manual), and connect it to the Type 1232-P2 B+ lead.

h. Set the Type 1232 and the Type 1311 along side the Type 1232-P2 and slide the instruments together so that the holes in the brackets on the outer instruments match up with those in the front panel of the Type 1232-P2.

i. Slide the Type 1232 end frame (removed in step d) back on its instrument and secure it and the brackets on the Type 1311 and Type 1232 to the Type 1232-P2 with the four front-panel screws removed in step c. The hole in this end frame should be underneath when the assembly is placed right-side up on its rubber feet.

j. Insert a 10-32, 1/2-in screw into the rear hole on the right-hand end frame of the Type 1311, and another into the rear hole on the left-hand end frame of the Type 1232. Thread these screws (which are those retained in steps b) into the white plastic plate.

k. Attach the two rack adaptor panels to the sides of the Type 1232 and Type 1311 as shown in Figure 5.

l. Plug the OUTPUT connector of the Type 1232-P2 into the INPUT jack of the Type 1232.

m. Mount the Type 1240-AP in a standard 19-in relay rack using the four 10-32 screws with cup washers included in the hardware package.

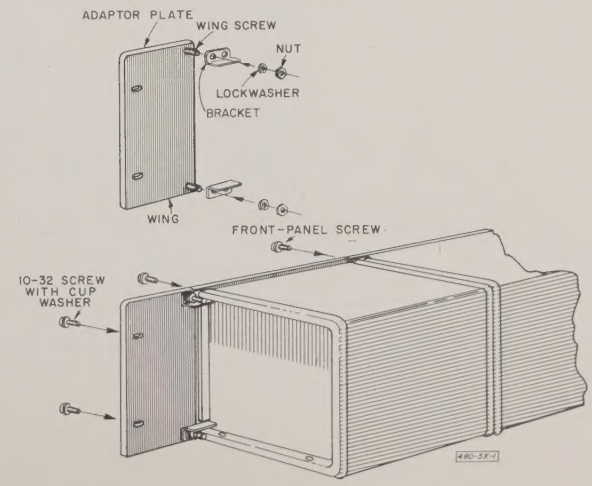


Figure 5. Attachment of rack panel adaptors to the Type 1240-AP.

ASSEMBLY OF THE TYPE 1620-AP

The dimensions of the Type 1620-AP Capacitance Measuring Assembly are shown in Figure 6.

Assemble the Type 1240-AP, rack model, according to the instructions supplied with this combination of instruments, except for steps k and m. Do not attach the rack adaptor panels as shown in Figure 5. Instead, attach the rack adaptor panels as follows:

a. Remove the front-panel screws on the right-hand side of the Type 1232 and on the left-hand side of the Type 1311. Discard the washers between the front panels and end frames.

b. Insert "ears" of the mounting plates included in the Type 1620-AP hardware set in the space between the front panels and the end frames of the Type 1232 and Type 1311.

c. Replace the front-panel screws removed in step a.

d. Insert two panel screws (those with the black cup washers) through the holes in the right-hand rack panel adaptor and then through the holes in the mounting plate attached to the Type 1232. Thread these screws into the right-hand end frame, thus securing end frame and panel adaptor to the Type 1232.

e. Similarly, attach the left-hand end frame and panel adaptor to the Type 1311.

f. Stack mount the Type 1240-AP with the Type 1615 according to instructions g through k in paragraph 2.3.2 of the Type 1615 instruction manual.

Table 2 lists the hardware included with the Type 1620-AP.

TABLE 2

Quantity	*Item*	*Part Number*
4	Bracket	0480-8070
1	Plate, White Plastic	1232-7300
2	Plate, Mounting	0480-8240
2	Plate, Adaptor	0480-8230
4	Screw, Panel with Cup Washers	7270-6210
1	End Frame Assembly, Left	5310-3081
1	End Frame Assembly, Right	5310-3080
1	End Frame Set	5310-9678
4	Screw, 10-32, 7/8-in	7080-2900
4	Nut, 10-32	5810-3300
4	Spacer, 15/32-in	7660-2015
4	Washer, Split	8040-2400

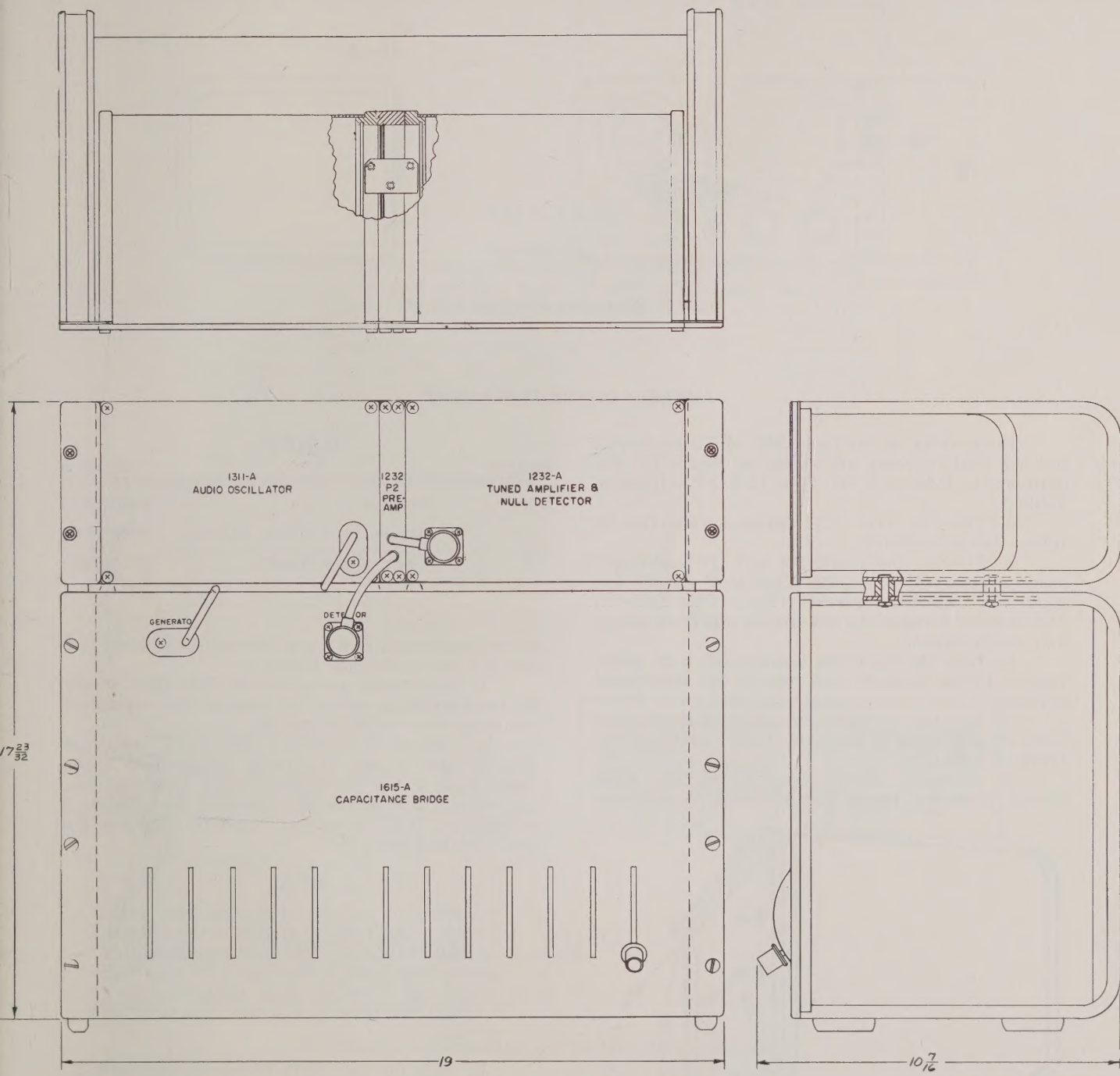


Figure 6. Dimensions of the Type 1620-AP.

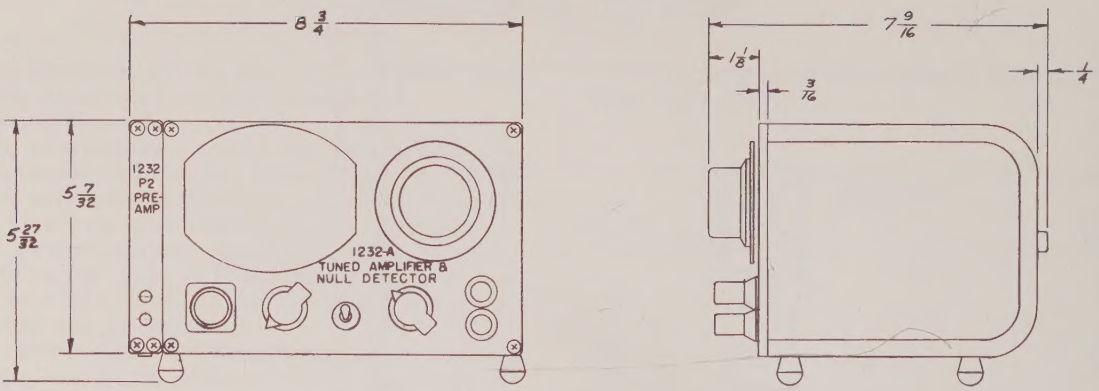


Figure 7. Dimensions of the Type 1232-AP.

ASSEMBLY OF THE TYPE 1232-AP

Dimensions of the Type 1232-AP Tuned Amplifier and Null Detector are shown in Figure 7. The hardware included with the Type 1232-AP is listed in Table 3.

a. Turn the Type 1232 upside down so that its rubber feet are upward.

b. Remove and retain the two left-hand front-panel screws (A) from the Type 1232 and the two right-hand front-panel screws from the Type 1232-P2. The washers between the end frames and front panels may be discarded.

c. Place the two brass brackets (B) in the space vacated by the washers and replace the front-panel screws.

d. Remove the rubber foot and associated screw from the left rear of the Type 1232. Discard this 1/2-in screw.

e. Thread a 5/8-in screw (C) into the white plastic plate (D), insert this screw in place of the screw removed in step c, and thread the rubber foot onto the new screw (see Figure 8).

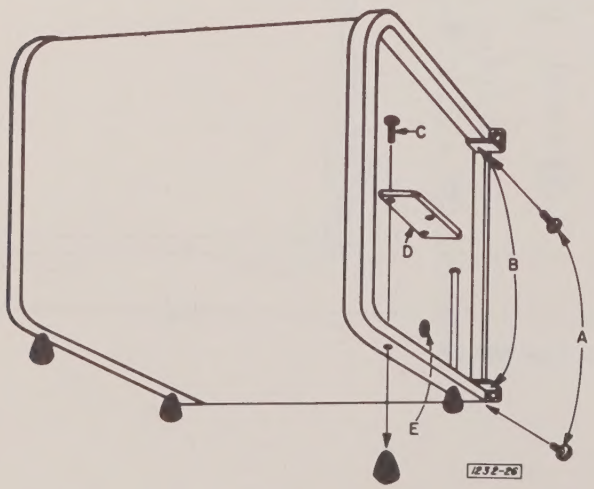


Figure 8. Assembly of the Type 1232-AP.

TABLE 3

Quantity	*Item*	*Part Number*
2	Bracket	0480-8070
2	Screw, Type 10-32, 5/8-in	7080-2000
1	Plate, White Plastic	1232-7300

f. Remove the cover from the Type 1232: loosen the two knurled screws at the rear of the instrument and slide the cover back and off.

g. Thread the white B+ lead from the Type 1232-P2 (see Figure 1) through the hole (E) in the lower back corner of the Type 1232. Plug the wire into the red jack inside the Type 1232 (see Figure 7 of the Type 1232 instruction manual). Replace the cover on the Type 1232.

NOTE

If there is no red B+ jack in your Type 1232, solder a short length of wire to the junction of R101, R102, and C102 on the preamplifier etched board inside the Type 1232 (see Figures 9 and 11 of the Type 1232 instruction manual), and connect it to the Type 1232-P2 B+ lead.

h. Slide the Type 1232-P2 onto the brackets (B), put the two front-panel screws (those with the fibroid washers) in place, and tighten.

i. Insert one of the 10-32 5/8-in screws (C) included with the Type 1232-P2 through the hole in the bottom of the preamplifier frame and screw it into the plastic plate.

j. Plug the OUTPUT connector of the preamplifier into the INPUT jack of the Type 1232.

PARTS LIST

Ref No.	*Description*	*Part No.*
C101	CAPACITOR, Plastic, 0.001 μF ±10% 200 dcwv	4860-7309
R101	RESISTOR, Composition, 10 Ω ±20%	6100-8108
R102	RESISTOR, Composition, 10 kΩ ±5%	6100-3105
R103	RESISTOR, Composition, 1 kΩ ±5%	6100-2105
Q101	TRANSISTOR, Type C6601A	8210-1082
S101	SWITCH, dpdt	7910-0791

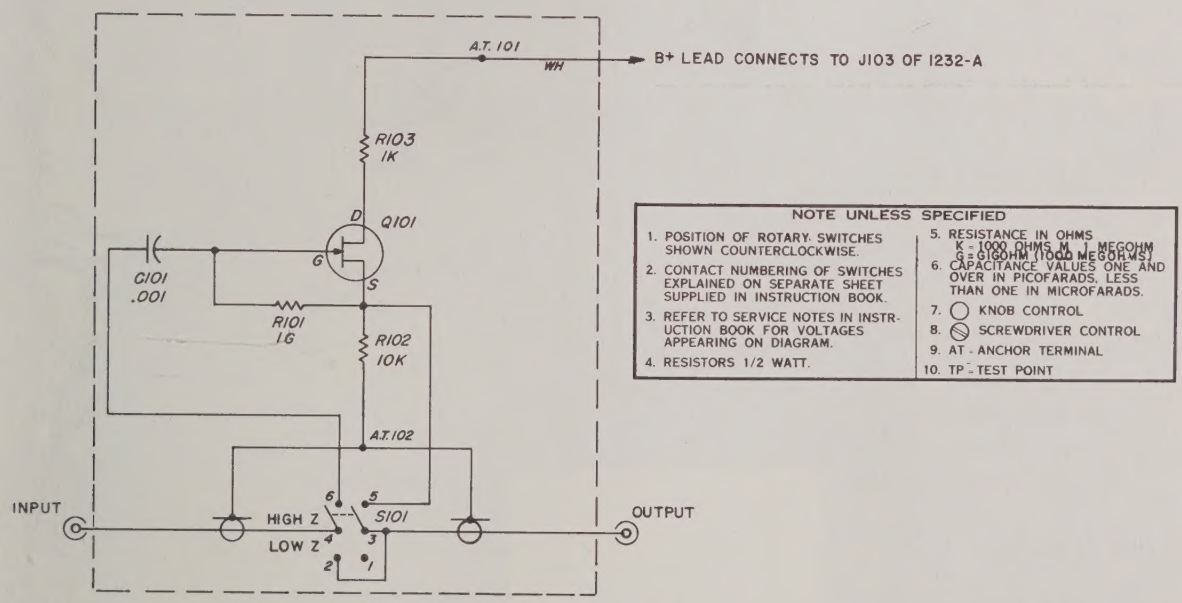


Figure 9. Schematic diagram of the Type 1232-P2 Preamplifier.

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